



WATER-RIGHT DOCKET

Cape Cod National Seashore

Docket No: 2

EASTHAM VISITOR CENTER WELL

Supporting Hydro Data

02-29-1968: letter to mr. stanton on final report; february 29, 1968



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
2300 John Fitzgerald Kennedy Federal Building
Boston, Massachusetts 02203

February 29, 1968

Mr. Richard L. Stanton, Chief
Office of Land and Water Rights
National Park Service
Washington Planning and Service Center
1730 North Lynn Street
Arlington, Virginia 22209

Attention: Mr. Richard W. Ketchum

Dear Mr. Stanton:

Enclosed is the final report of supervisory work by John Cotton of the Boston office of the Water Resources Division for the National Park Service under Contract No. 14-10-5-609-204 for Test Well Drilling at Hemenway Landing, Nauset Light, Eastham Visitor Center, and Griffin Island. All work was completed by The Able Drillers and Pump Company on September 2, 1967, in accordance with the plans and specifications of the contract.

Enclosed also is Standard Form 1081 prepared in accordance with the instructions in your letter of February 26, 1968.

A summary for each area is tabulated below.

	Well Depth	Well Development	Test Pumping	Test Drilling Hole / Depth
Hemenway Landing	99.2 ft.	24 hrs.	8 hrs.	1 106 ft.
Nauset Light	137.8 ft.	25.5 hrs.	9 hrs.	1 112 ft. 2 150 ft.
Eastham Visitor Center	115.7 ft.	24 hrs.	8 hrs.	1 120 ft. 2 111 ft.
Griffin Island	95.9 ft.	24 hrs.	10 hrs.	1 105 ft.

Mr. Richard Stanton

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The design sustained yield for each well was 20 gallons per minute (gpm); all four wells may be pumped safely at 20 gpm. In fact, all four wells will yield much more than 20 gpm. However, pumping from shallow coastal aquifers involves the danger of inducing salt-water movement into the fresh ground-water reservoir. One good principle to follow in establishing pumping schedules is not to allow the water level to fall below mean sea level (msl). The "maximum" yield (following the above principle) for each of the four wells is given in the geohydrologic descriptions of the wells. Unfortunately, even with this precaution, salt-water encroachment may still occur with prolonged pumping. Therefore, the highest pumping rates should not exceed 50 percent of the "maximum" yield reported for each well.

Very truly yours,


C. E. Knox
District Chief

JEC:g

Encls. Report, 4 copies
SF1081, 6 "

TEST WELL DRILLING AT EASTHAM VISITOR CENTER

Location of well. This well is about 25 feet northeast of the northeast corner of the assembling area at the end of the bicycle path (see figure 1).

Physical description of well. This 8-inch diameter well is 115.9 feet deep with a 10 foot Johnson stainless steel split screen (#25 from 105.9 to 111.9 feet and #40 from 111.9 to 115.9 feet). The well casing extends 2.0 feet above the land surface; the top of the first coupling is 3.8 feet below land surface. For details see figure 4.

Geohydrologic description of well. The well is screened in unconsolidated sands and gravelly sands. See table 6 for the log of subsurface materials. The land surface is 36.0 feet above mean sea level (msl). On August 31, 1967, the static water level was 22.72 feet below land surface or about 13 feet above msl. Ocean tides probably affect the water level.

The well was pumped for 8 hours at 47 gpm; however, the pump broke down for a short while at the end of 5 hours. At that time the drawdown was about 2.4 feet. Based on this information the specific capacity of the well is about 19.6 gpm. With a drawdown of 13 feet this well will yield about 250 gpm. The design yield of 20 gpm is possible with no danger of salt-water encroachment.

Chemical quality of water. After 8 hours of pumping the chloride content (24 ppm) had not changed and was a little lower than much of the fresh ground water on Cape Cod. The iron content (0.95 ppm) was a little high; probably no treatment will be necessary. The complete chemical analysis is in table 8.

During test drilling the quality of water from a second test well was determined. The iron content (0.31 ppm) was appreciably lower than in the first area. However, to incorporate this well into the water supply a water main would have had to cross not only Nauset Road but also the entire parking area of the Visitor Center. The cost for this would exceed any treatment cost of the water from the first area. The complete chemical analysis of the water sample from this other test well is in table 9.

Test drilling. Two test wells were drilled; the first, about 2 feet southwest of the final well, was drilled to a depth of 120 feet. The log of this well is in table 6. The second test well, about 80 feet north of Nauset Road opposite the northeast corner of the parking area (figure 1), was drilled to a depth of 111 feet. The log of this well is in table 7.

The first test site was favored because of cost of incorporating this new, additional supply into the present system.

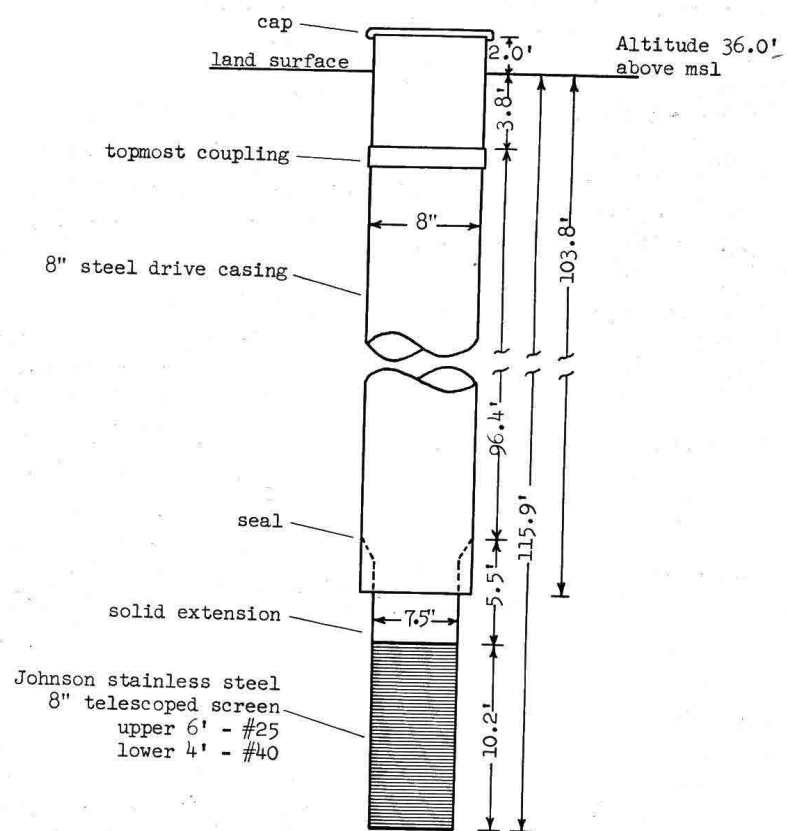


Figure 4.--Design of well at Eastham Visitor Center

Table 6.--Generalized combined log of first test well
and final well at Eastham Visitor Center

Sample interval (ft. below surface)	Material description
0 - 12	Gravelly sand; sand, medium to very coarse, buff; gravel, very fine to coarse
12 - 20	Silty sand, very fine and fine, reddish brown
20 - 25	Silty sand, very fine and fine, reddish brown
25 - 28	Gravelly sand; sand, medium to very coarse, reddish brown; gravel, very fine to coarse
28 - 35	Silt, minor clay and fine sand, buff; scattered pebbles
35 - 40	Silt, minor clay and fine sand, buff and reddish brown
40 - 46	Silt, minor clay and fine sand, buff and reddish brown
46 - 49	Sand, medium, buff
49 - 50	Silt, minor clay and fine sand, reddish brown
50 - 55	Sand, fine; some silt, reddish brown
55 - 60	Sand, fine; some silt, reddish brown
60 - 68	Silt, clayey; some very fine sand, brownish gray
68 - 72	Silt, clayey; some very fine sand, brownish gray
72 - 73	Sand, medium and coarse, buff
73 - 77	Gravelly sand; sand, coarse and very coarse, light brownish gray; gravel, very fine
77 - 80	Sand, medium and coarse, light brownish gray
80 - 85	Sand, medium to very coarse, light brownish gray; some very fine gravel
85 - 94	Sand, coarse and very coarse, well sorted, rusty red
94 - 100	Sand, coarse and very coarse, well sorted, rusty red
100 - 102	Sand, medium and coarse, light gray
102 - 104	Sand, medium to very coarse, light gray; minor very fine gravel
104 - 110	Sand, medium to very coarse, light gray; minor very fine gravel
110 - 113	Gravelly sand; sand, medium to very coarse, light gray; gravel, very fine and fine
113 - 115	Gravelly sand; sand, coarse and very coarse, light gray; gravel, very fine to medium
115 - 118	Gravelly sand; unreliable sample
118 - 120	Sand, very fine, gray; wood chips

Table 7.--Generalized log of second test well at Eastham Visitor Center

Sample interval (ft. below surface)	Material description
0 - 10	Gravelly sand; sand, medium and coarse, reddish brown; gravel, very fine to coarse
10 - 20	Sand, fine and medium, reddish brown
20 - 25	Sandy gravel; gravel, very fine and fine; sand, medium to very coarse; reddish buff
25 - 30	Sandy gravel; gravel, very fine and fine, angular; sand, coarse and very coarse; buff
30 - 35	Gravelly sand; sand, medium to very coarse, grayish buff; gravel, very fine and fine
35 - 37	Sandy gravel; gravel, very fine and fine; sand, medium to very coarse; grayish buff
37 - 41	Sandy gravel; gravel, very fine and fine; sand, medium to very coarse; grayish buff
41 - 47	Silt, some very fine and fine sand, buff
47 - 51	Clayey silt, thin gray and brown layers
51 - 53	Sand, medium and coarse, rusty red
53 - 55	Sand, medium and coarse, reddish brown
55 - 57	Sand, fine and medium, reddish brown
57 - 63	Silty clay, gray
63 - 64	Sandy silt, reddish brown
64 - 70	Clayey silt, gray
70 - 78	Clayey silt, gray
78 - 79	Sand, medium and coarse, gray
79 - 83	Sand, very fine and fine, gray
83 - 84	Sand, medium, light reddish brown
84 - 85	Sand, medium and coarse, grayish brown
85 - 86	Sandy gravel; gravel, very fine and fine; sand, coarse and very coarse; grayish buff
86 - 91	Sandy gravel; gravel, very fine and fine; sand, very coarse; well sorted, grayish buff
91 - 98	Gravelly sand; sand, medium and coarse, reddish buff; gravel, very fine and fine
98 -104	Sand, fine and medium, buff
104 -111	Sand, fine and medium, buff

Table 8.--Complete chemical analysis, in parts per million,
of water from final well at Eastham Visitor Center

Date of collection-----	8/31/67	Chloride (Cl)-----	24
Temperature (°F)-----	52	Fluoride (F)-----	.2
Silica (SiO ₂)-----	14	Nitrate (NO ₃)-----	.0
Iron (Fe) total-----	.95	Dissolved solids	
Manganese (Mn) dissolved--	.08	Calculated-----	83
Calcium (Ca)-----	3.8	Residue on evaporation at 180°C--	90
Magnesium (Mg)-----	2.9	Hardness as CaCO ₃ -----	22
Sodium (Na)-----	16	Non-carbonate-----	14
Potassium (K)-----	.9	Specific conductance	
Bicarbonate (HCO ₃)-----	10	(micromhos at 25°C)-----	138
Carbonate (CO ₃)-----	0	pH-----	6.5
Sulfate (SO ₄)-----	16	Color-----	0

Table 9.--Complete chemical analysis, in parts per million,
of water from second test well at Eastham Visitor Center

Date of collection-----	8/4/67	Chloride (Cl)-----	26
Temperature (°F)-----	52	Fluoride (F)-----	.1
Silica (SiO ₂)-----	9.6	Nitrate (NO ₃)-----	.0
Iron (Fe) total-----	.31	Dissolved solids	
Manganese (Mn) dissolved--	.10	Calculated-----	79
Calcium (Ca)-----	5.2	Residue on evaporation at 180°C--	81
Magnesium (Mg)-----	2.7	Hardness as CaCO ₃ -----	24
Sodium (Na)-----	16	Non-carbonate-----	6
Potassium (K)-----	1.0	Specific conductance	
Bicarbonate (HCO ₃)-----	22	(micromhos at 25°C)-----	138
Carbonate (CO ₃)-----	0	pH-----	6.9
Sulfate (SO ₄)-----	7.5	Color-----	0



Figure 1.--Location of wells at Hemenway Landing, Nauset Landing, and Eastham Visitor Center

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Docket Information

Number of Documents in Docket 8

Documents Dated from 2/29/1968 to 2/29/1968

Docket Compiled: 2/1/2011